

**REMARKS**

In the Office Action, the drawings and specification were objected to due to minor informalities. Claims 1-30 were rejected. By the present Response, claims 1, 3, 4, 6, 12, 18, 29, and 30 are amended. Claims 2, 5, and 10 are canceled. Upon entry of the amendments, claims 1, 3, 4, 6-9 and 11-30 will be pending in the present patent application. Reconsideration and allowance of all pending claims are requested.

**Objection to the Specification**

The specification is objected to because of certain informalities in reference characters (same reference label used for both the current sensor and the common conductor in paragraphs 20 and 21). The paragraphs 20 and 21 of the specification are amended to obviate the objections raised in the Office Action. Review and acceptance of the replacement paragraphs are requested.

**Objection to the Drawings**

The drawings were objected to because of the same informalities characters. Two sheets of the drawings have been replaced to obviate the objections raised in the Office Action. Review and acceptance of the replacement drawings are requested.

**Claim objections due to informalities**

In the Office Action, claim 6 is objected to due to certain informalities. Claim 6 is amended to obviate the objections raised in the Office Action. In particular, claim 6 is amended to obviate objections due to lack of antecedent basis. No new matter has been added. Thus, reconsideration and allowance of the amended claim are requested.

**Rejections Under 35 U.S.C. § 103**

The Examiner rejected independent claims 1, 6, 12, 18, 29, 30 and their dependent claims under 35 U.S.C. § 103(a) as being unpatentable over Kohler et al., (U.S. Patent 5,270,640, hereinafter “Kohler”) in view of Kammer et al., (U.S. Patent

6,392,422, hereinafter “Kammer”), or in view of these combined with teachings of Kildishev et al., (U.S. Patent 3,746,979, hereinafter “Kildishev”) and Ward, (U.S. Patent 5,194,817, hereinafter “Ward”).

**Claim 1 and the Claims Depending Therefrom**

Claim 1 and claims depending therefrom are allowable for the reasons mentioned below.

Claim 1 is amended to recite an insulation condition monitoring method for a rotating electric machine. In accordance with the method, a second set of values for a differential phasor current and a phasor voltage are calculated based upon a first set of values of instantaneous differential current and instantaneous phase voltage. An angular relationship between the differential phasor current and the phasor voltage is then calculated. The claim further recites *calculating a dissipation factor* based on the angular relationship between the differential phasor current and phasor voltage. Finally, insulation condition is determined based on the dissipation factor. Claim 3 is amended to depend from claim 1 and recites wherein the angular relationship includes a phase angle between the differential phasor current and the phasor voltage. Claim 4 is amended to depend from claim 1 and recites further comprising determining insulation condition based on an AC insulation resistance value.

As set forth in paragraph 22 of the present application, the complement of the angle  $\theta$ , indicated by the angle  $\delta$  and reference numeral 82 in FIG. 4 provides an indication of insulation condition. As set forth in paragraph 23 of the present application, a dissipation factor may be defined as the measure of the degree of electrical loss due to imperfect condition of the insulation of an electrical system. The dissipation factor, which may be computed as the tangent of the angle  $\delta$ , is determined from the ratio of the resistive current component to the capacitive current component.

With respect to Kohler, FIG. 9 and 10(b) of this reference illustrate determining negative sequence voltage and current vector values, and calculating effective negative sequence impedance phasor angles from the negative sequence voltage and current vector values. This reference does not describe computing the dissipation factor or any comparable parameter, and determining the insulation condition based on the dissipation factor.

With respect to Kammer, FIG. 5 of this reference illustrates an evaluation circuit in the form of a network-supplied differential current or fault current relay. The phase angle between the first and second network variables is determined in the differential current relay. The product of the amplitude of the AC component of the differential current and the cosine of the phase angle between the two network variables detected is ascertained, as a measure for the resistive fault current of the network. Kammer, however, similarly fails to disclose computing the dissipation factor and determining the insulation condition based on the dissipation factor.

Because Kohler and Kammer, alone or in combination, fail to teach all of the recitations of claim 1, even if considered with the teachings of Kildishev, a *prima facie* case of obviousness of the independent claim 1 cannot be supported. Thus, reconsideration and allowance of amended claims 1, 3, and 4 are requested.

**Claim 6 and the Claims Depending Therefrom**

Claim 6 and claims depending therefrom are allowable for the reasons mentioned below.

Claim 6 is amended to recite a method of operating an insulation condition monitoring system. In the method, a second set of values for a differential phasor current and a phasor voltage are calculated based upon a first set of values of instantaneous differential current and the instantaneous phase voltage. As before, an

angular relationship between the differential phasor current and the phasor voltage is calculated. At least one desired parameter is then calculated based on the angular relationship between the differential phasor current and the phasor voltage for determining insulation condition. The at least one desired parameter includes a dissipation factor.

As noted above, neither Kohler nor Kammer describe computing the dissipation factor and determining the insulation condition based on such a dissipation factor. Because Kohler and Kammer, alone or in combination, fail to teach all of the recitations of claim 6, even if considered with the teachings of Kildishev, a *prima facie* case of obviousness of the independent claim 6 cannot be supported. Thus, reconsideration and allowance of amended claim 6 and claims depending therefrom are requested.

**Claim 12 and the Claims Depending Therefrom**

Claim 12 and claims depending therefrom are allowable for the reasons mentioned below.

Claim 12 is amended to recite an insulation condition monitoring system for a rotating electric machine. The system includes a processing module coupled to the current sensor and to a voltage sensor, the processing module being configured for converting the values for instantaneous differential current and instantaneous phase voltage to respective values for differential phasor current and phasor voltage. The processing module is further configured to calculate an angular relationship between the differential phasor current and phasor voltage, to calculate a dissipation factor based on the angular relationship between the differential phasor current and phasor voltage, and to generate an output based on the dissipation factor as an indication of insulation condition.

With respect to Kohler, as noted above, FIG. 9 and 10(b) of this reference illustrate a CPU configured to determine negative sequence voltage and current vector values, and calculate effective negative sequence impedance phasor angles from the negative sequence voltage and current vector values. This reference does not describe a processing module configured to compute the dissipation factor and determine the insulation condition based on the dissipation factor. With respect to Kammer, this reference similarly fails to disclose a processing module configured to compute the dissipation factor and determining the insulation condition based on the dissipation factor.

Because Kohler and Kammer, considered separately or in combination would not read on the claimed arrangement, a *prima facie* case of obviousness for the independent claim 12 cannot be supported. Thus, reconsideration and allowance of amended claim 12 and the claims depending therefrom are requested.

**Claim 18 and the Claims Depending Therefrom**

Claim 18 and claims depending therefrom are believed to be equally allowable.

Claim 18 is amended to recite a rotating electric machine comprising a processing module coupled to the current sensor and the voltage sensor. The processing module is configured for converting the values for instantaneous differential current and instantaneous phase voltage to respective values for differential phasor current and phasor voltage. The processing module is further configured to calculate an angular relationship between the differential phasor current and phasor voltage, to calculate a dissipation factor based on the angular relationship between the differential phasor current and phasor voltage and to generate an output based on the dissipation factor as an indication of insulation condition.

As discussed above, neither Kohler nor Kammer describe a processing module configured to compute the dissipation factor and determining the insulation condition based on the dissipation factor. Because Kohler and Kammer, considered separately or in combination would not read on the claimed arrangement, even if considered with the teachings of Ward, a *prima facie* case of obviousness for the independent claim 18 cannot be supported. Thus, reconsideration and allowance of amended claim and the claims depending therefrom are requested.

### **Claims 29 and 30**

Claim 29 recites a system, in means plus function elements, for carrying out the functionality of the steps of claim 1. Claim 30 recites a computer program for implementing such a method. Claims 29 and 30 are therefore believed to be allowable for the same reasons as summarized with respect to claim 1. Thus, reconsideration and allowance of amended claims 29 and 30 are requested.

### **Conclusion**

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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Patrick S. Yoder  
Reg. No. 37,479  
FLETCHER YODER  
P.O. Box 692289  
Houston, TX 77269-2289  
(281) 970-4545

**IN THE DRAWINGS**

Please replace the pages of drawings including Figure 2 and Figure 3 as originally filed with the replacement pages attached with the present response.